

NASA TECH BRIEF



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DC Pin-to-Pin Testing of Integrated Circuits

The problem:

To develop a nondestructive test method that will measure the electrical characteristics of each element in an integrated circuit.

Because of the limited access to the individual elements in integrated circuits, evaluation of these circuits has been based on overall performance or functional tests. This type of threshold or go-no go functional testing does not readily identify subtle abnormalities or changes in the electrical characteristics of the elements which affect the reliability of the integrated circuits.

The solution:

An external pin-to-pin testing procedure that uniquely evaluates the individual elements of the integrated circuit. The procedure involves choosing specific pairs of pins and applying appropriate test voltages to them. Then by following an equivalent-circuit resolution, it is possible to measure the electrical characteristics (e.g., forward voltage drop, resistance, and reverse breakdown voltage) of the elements within the portion of the circuit under examination.

Notes:

1. A pin-to-pin test plan was developed for a commercial silicon monolithic 6-input gate by the

method briefed above. The test plan involved measurements using 20 different pin combinations and 58 individual tests. These tests were performed on automatic test equipment at the rate of 1 device per minute, approximately the time needed to perform a conventional function test. A computerized data analysis program, which permits rapid processing of the test results, was also developed for this type of gate circuitry. The computer program identifies the serial number of any defective circuit, the defective element, and the test reading for that element.

2. This method appears to be a powerful new tool for more effective device and/or production lot screening of integrated circuits.
3. Inquiries concerning this development may be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland 20771
Reference: B68-10001

Patent status:

No patent action is contemplated by NASA.

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Category 01